Purdue Road School

General Aviation Airports: Innovative Revenue Strategies

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PROBLEM AND APPROACH

Airports are closing

- 170 closures from 2000 to 2010
- Worst year: 2006 with 27 closures

Famous Airport Closures

- Chicago's Meigs Field 2003
- Atlantic City's Bader Field 2006

Approach

- Innovative revenue generation strategies
- Develop a decision making process for airports

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FIVE INNOVATIVE STRATEGIES

- Science, Technology, Engineering and Math Education (STEM)
- Electric Ground Vehicle Support
- Alternative Fuel Uses
- Renewable Energy
- Commercial Space Rental

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STEM

Science

Technology

Engineering

Math Education

- Funding from school systems to teach STEM classes
- Expands potential customer base
- Community involvement

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ELECTRIC GROUND VEHICLE

FranckinJapan (2017). Electrical vehicle charging point. Licensed under Creative Commons Zero on pixabay.com

- 60% of the energy used is transferred to wheels
- Less maintenance
- No air pollutants
- Very quiet

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ALTERNATIVE FUEL USES

League, C. (2013) Boatas. Licensed under Creative Commons Zero on flickr.com

- Sell aviation fuel to other users
- Consistent, high octane
- Alcohol free
- Racecars and boats

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RENEWABLE ENERGY

Hpgruesen (2016). Renewable energy. Licensed under Creative Commons Zero on pixabay.com

Solar

- Up to 49,837 Exajoules worldwide annually
- Could power the world by itself until 2100

Wind

- 11 States of U.S. used wind for more than 10% of their power

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COMMERCIAL SPACE RENTAL

Airport and farm. (2017) Licensed under Creative Commons Zero on pxhere.com

- Airports have large amounts of land and facilities
- Non-aeronautical leases, such as local business

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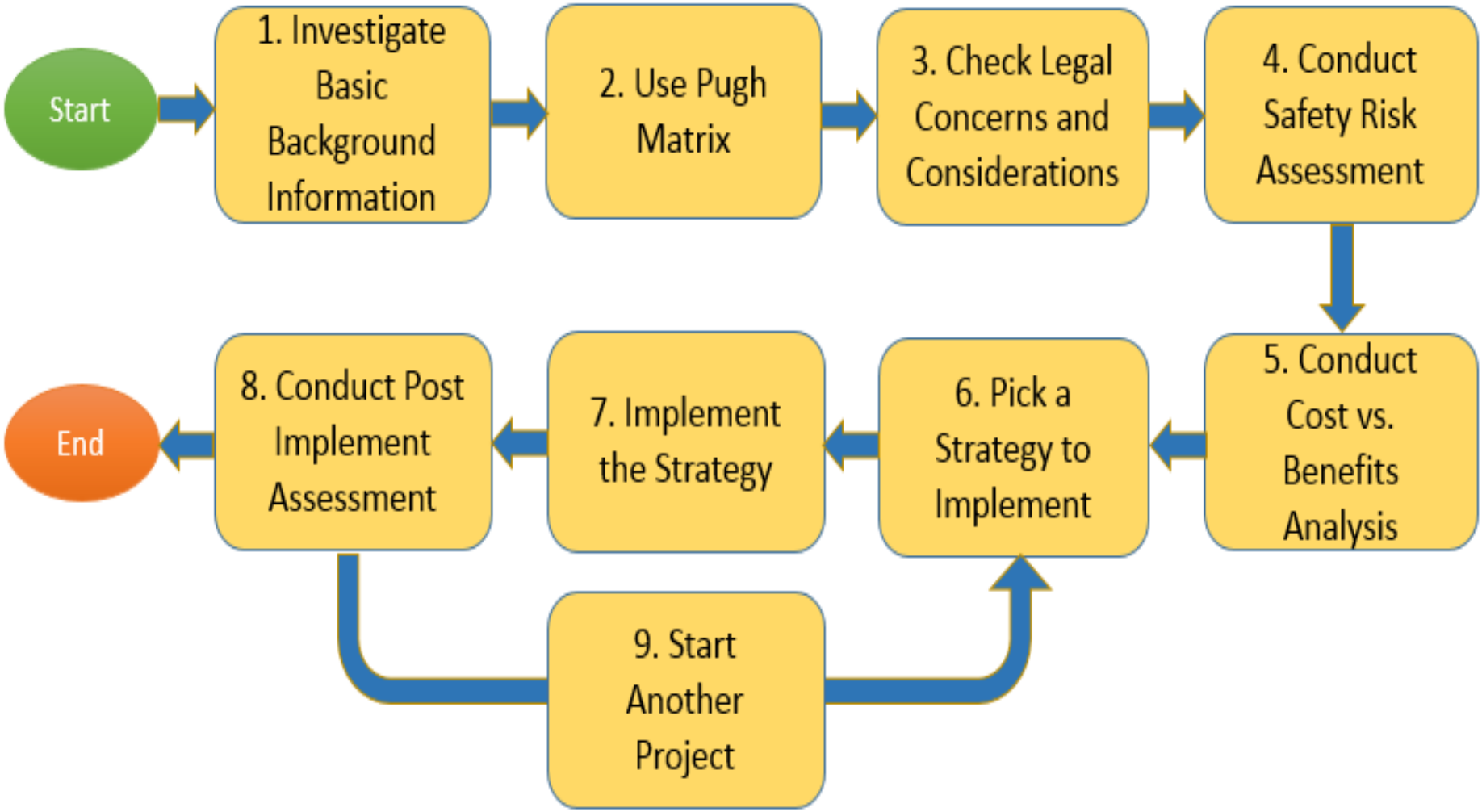
PROBLEM SOLVING PROCESS



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STEP 1. INVESTIGATE BASIC BACKGROUND

- Basic information on different revenue generation strategies
- Can be different than the ones the team recommended

Wright, R. (2012). Information overload photograph. Licensed under Creative Commons Zero on flickr.com

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STEP 2. USE PUGH MATRIX

USES QUADRUPLE BOTTOM LINE: EONS

Revenue Generation Pugh Matrix for KKLY Airport

	EONS Criteria		Baseline (Current Strategies)		Solar Energy		Wind Energy		Alternative Fuel Sales	
		Wt (1-3)	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score
Economic	**Revenue Generation** (Amount of additional revenue to be generated by the new strategy)	3	0	**0**	3	**9**	3	**9**	2	**6**
Economic	**Start-up Costs** (purchase and installation of equipment and facilities)	3	0	**0**	-1	**-3**	-2	**-6**	1	**3**
Economic	**Maintenance Costs** (Any cost to maintain, repair or upgrade facilities, tools or equipment)	1	0	**0**	-2	**-2**	-2	**-2**	-1	**-1**
Economic	**Operating Costs** (cost to operate day to day including labor, taxes, and energy costs)	1	0	**0**	-1	**-1**	-2	**-2**	0	**0**
Economic	**Facilites/Land Available** (Is there space that can be used for the strategy including offices, hangars, and land)	3	0	**0**	1	**3**	-1	**-3**	1	**3**
Operational	**Improve Infrastructure and Operations** (Does the strategy help the airport operate more efficiently)	1	0	**0**	1	**1**	1	**1**	2	**2**
Operational	**Encourage Alternative Fuel or Energy Usage** (Does the strategy improve the use of alternative power sources on the airport)	1	0	**0**	3	**3**	3	**3**	3	**3**

STEP 2. USE PUGH MATRIX

Revenue Generation Pugh Matrix for KKLY Airport										
	EONS Criteria		Baseline (Current Strategies)		Solar Energy		Wind Energy		Alternative Fuel Sales	
		Wt (1-3)	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score	Rating (-3 to 3)	Score
Natural Resource	**Air Quality** (Does the stategy increase or decrease the air pollution in the surrounding area)	2	0	**0**	0	**0**	0	**0**	1	**2**
	Land Pollution (Does the stragtegy create additional pollution to surrounding land)	2	0	**0**	0	**0**	0	**0**	0	**0**
	Reduce Energy Usage (Reduce the amount of power that must be purchased from the power companies in the area)	3	0	**0**	3	**9**	3	**9**	-1	**-3**
Social	**Legally permitted** (Does any legislation prevent you from using the strategy for any reason)	3	0	**0**	0	**0**	0	**0**	0	**0**
	Safety (Does the technology increase or decrease safety of all operation occuring at and around the airport)	3	0	**0**	-1	**-3**	-3	**-9**	0	**0**
	Community Service Opportunity (Is there a benefit for the surrounding community)	2	0	**0**	2	**4**	2	**4**	2	**4**
	Noise Pollution (Does the stragtegy create additional noise or reduce the noise in the surrounding area)	1	0	**0**	0	**0**	-2	**-2**	0	**0**
Total				**0**		**20**		**2**		**19**

STEP 3. CHECK LEGAL CONCERNS

- In depth legal investigation
    - Investigate for any legal concerns
    - Investigate legal considerations

Baney, N. (2013). Background check lawyer photograph.
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STEP 4. CONDUCT SAFETY RISK

Severity / Likelihood	1. No Safety Effect	2. Minor	3. Major	4. Hazardous	5. Catastrophic
5. Frequent	5	10	15	20	25
4. Probable	4	8	12	16	20
3. Remote	3	6	9	12	15
2. Extremely Remote	2	4	6	8	10
1. Extremely Improbable	1	2	3	4	5

High Risk
Medium Risk
Low Risk

Federal Aviation Administration. (2007). Predictive Risk Matrix

STEP 4. CONDUCT SAFETY RISK

Risk	Severity	Likelihood	Risk Level	Risk Management Actions
Physical Penetration of airspace	2. Minor	2.Extremely Remote	4	Ensure installation of solar panels in the Proper place
Communication Systems Interference	1. No Safety Effect	1. Extremely Improbable	1	N/A
Visual Impacts from Glare	2. Minor	1. Extremely Improbable	2	Ensure installation of solar panels in the right place
Cause a Fire	4. Hazardous	3. Remote	12	Proper monitoring & airport fire department training
Injuries During Installation	2. Minor	1. Extremely Improbable	2	Following Safety rules set by the contractor
Injuries During Maintenance	3. Major	1. Extremely Improbable	3	Following Safety rules set by the maintenance provider
Damage to Existing Environment	1. No Safety Effect	2. Extremely Remote	2	Proper initial investigation into airport surrounding environment

STEP 5. CONDUCT COST BENEFIT

Cost	Rate	Quantity	Subtotal	Remarks
Research & Analysis	$25/hour	200 hours	$5,000	Time that project team spent
PV systems	$2,493/kW	100 kW	$249,300	Purchase & Installation
O&M for 33 years	$1,800/yr	33 years	$59,400	Operation and Maintenance for the lifetime of the system
Total			**$313,700**	Total cost of the project for its lifetime

Benefit	Rate	Quantity	Subtotal
Offset electricity bills of airport	$12,000/year	33 years	$396,000
Total			**$396,000**

ROIC = 0.26

$$\text{ROIC} = \frac{\text{Cumulative net annual gains from investment} - \text{Total cost of investment}}{\text{Total cost of investment}}$$

STEP 6. **PICK A STRATEGY**

- Using all the information gathered to this point, pick a strategy to implement

Doughty, T. (2009) Airport photograph. Licensed under Creative Commons Zero on flickr.com

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STEP 7. IMPLEMENT STRATEGY

- Continually monitor implementation
- Address any issues that arise
    - Stop the process if major problems arise

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STEP 8. POST IMPLEMENTATION ASSESSMENT

- Is the strategy working as planned?
- "EONS" Quadruple Bottom Line

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STEP 9. START ANOTHER PROJECT

- Use the decision making process to select another strategy for your airport

Shamblen, B. (2013) 24 Hours of LeMons photograph. Licensed under Creative Commons Zero on flickr.com

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OTHER SOURCES

FAA Airport Sustainability Website, https://www.faa.gov/airports/environmental/sustainability/

Sustainable Aviation Guidance Alliance (SAGA), http://www.airportsustainability.org/

Airport Cooperative Research Program (ACRP) Synthesis 10: Airport Sustainability Practices, http://www.trb.org/Publications/Blurbs/Airport_Sustainability_Practices_160369.aspx

ACRP Synthesis 21: Airport Energy Efficiency and Cost Reduction, http://www.trb.org/Publications/Blurbs/164002.aspx

ACRP Synthesis 24: Strategies and Financing Opportunities for Airport Environmental Programs, http://www.trb.org/main/blurbs/165852.aspx

ACRP 53: Outcomes of Green Initiatives: Large Airport Experience, http://www.trb.org/Main/Blurbs/170655.aspx

ACRP Synthesis 66: Lessons Learned from Airport Sustainability Plans, http://www.trb.org/Publications/Blurbs/172887.aspx

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Thank you!

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